

INTEGRATING SPACE SCIENCE**● Nuclear-Powered Space Probes**

To generate electricity, some deep space probes carry a nuclear power generator called a radioisotope thermoelectric generator, or RTG. RTGs convert the energy from a radioisotope, such as uranium-238, into electricity. Unlike traditional nuclear reactors used in power plants, RTGs do not rely on nuclear fission to produce energy. Instead, an RTG draws its power from energy that is released during the nuclear decay of a radioisotope.

How an RTG Works

As the name suggests, thermoelectric energy refers to a process of generating electricity from heat. The energy from radioactive decay is transferred as heat to produce a difference in temperature between two different semiconductor materials. As the radioisotope decays, it gives off energy that raises the temperature of one of the materials. When the two materials are joined to form a circuit and one of the materials is at a higher temperature, an electric voltage is produced. This voltage generates an electric current in the circuit.

Besides being used to power the instruments and other functions on a spacecraft, a radioisotope thermoelectric generator is also used to provide electric power for deep-ocean probes and remote weather station instruments.

Your Turn to Think

1. What does a radioisotope provide in the working of an RTG?
2. In an RTG, describe what causes the electric current to flow when two semiconductor materials are connected in a circuit.
3. What is the advantage of using radioisotopes instead of fossil fuel or solar energy to produce a temperature difference between the two materials in an RTG?